



TIGER 2016

Preparing a Benefit-Cost Analysis

Presented by the Office of the Assistant
Secretary for Transportation Policy
United States Department of Transportation



- Transportation Investment Generating Economic Recovery (TIGER) discretionary grant program for surface transportation infrastructure projects
 - This will be the 8th round of TIGER – *Octavo Tigris*
- For projects forwarded to senior review team, US DOT economic experts review the applicant's benefit-cost analysis (BCA) and attempt to determine the likelihood that the benefits exceed costs (i.e. not the applicant's self-determination)
 - BCA Assessment
 - Benefits > Costs
 - Uncertain, but Probably Benefits > Costs
 - Uncertain, but Probably Benefits < Costs
 - Benefits < Costs



+ Executive Summary

- Complete description of projects, costs & benefits, project matrix & summary spreadsheet – if separate sub-projects have separate matrix/summary for each one

Current Status/Baseline & Problem to be Addressed	Change to Baseline/ Alternatives	Type of Impacts	Population Affected by Impacts	Economic Benefit	Summary of Results	Page Reference in BCA
Stop light at lightly used (non-peak) rural intersection / excess waiting time and safety hazard	Replace with roundabout /signal phasing improvement	Reduce wait time for vehicles (non-peak) & reduce accidents (peak)	Number of drivers with reduced wait time & number of accidents/fatalities & injuries per year	Monetized value of reduced travel times, emissions, and accident costs	Estimated dollar value of time savings, reduced pollution, and safety benefits	pp. 15-18 and p.19

Calendar Year	Project Year	Affected Drivers	Travel Time Saved ¹	Value of Time Saved (\$2014) ²	Initial Costs (\$2014) ³	Operations & Maintenance Costs (\$2014)	Undiscounted Net Benefits	Discounted at 7%
2016	1				\$ 38,500,000	\$ 6,000,000	\$ (44,500,000)	\$ (41,588,785)
2017	2	80,000	1,040,000	\$ 20,300,800		\$ 700,000	\$ 19,600,800	\$ 17,120,098
2018	3	95,000	1,235,000	\$ 24,107,200		\$ 700,000	\$ 23,407,200	\$ 19,107,248
2019	4	100,000	1,300,000	\$ 25,376,000		\$ 700,000	\$ 24,676,000	\$ 18,825,202
2020	5	102,000	1,326,000	\$ 25,883,520		\$ 700,000	\$ 25,183,520	\$ 17,955,502
2021	6	109,000	1,417,000	\$ 27,659,840		\$ 700,000	\$ 26,959,840	\$ 17,964,480
NPV								\$ 49,383,744
1. Number of drivers times 3 minutes per day (3/60 hours) over 260 workdays								
2. Hours at \$19.52 per hour for All Purpose intercity travel (\$2014)								
3. Includes costs from delays during construction								





Baselines

- Applicants should measure costs and benefits of a proposed project against a baseline (“base” or “no build”)
- As a starting point, reasonable to forecast that that baseline resembles the present state
 - factor in any projected changes (e.g., baseline economic growth, increased traffic volumes, or completion of already planned and funded projects) that would occur even in the absence of the requested project
 - Factor in continued maintenance, etc. (sound asset management)
- Project must have independent utility
- Limit analysis to TIGER funded project only!





Baselines – Common Mistakes

- Using projected traffic levels in future (e.g. 2030) for baseline traffic to generate benefits – inflates benefits
- Not considering positive impact from other planned projects
- Unrealistic traffic assumptions on diverted traffic
 - e.g. claiming diversion of thousands of miles from a short freight rail spur project
- Grouping unrelated projects to justify negative net benefit projects
- Claiming benefits from an entire project but only costs from the TIGER funded part





Alternatives & Affected Population

- Applicants need to present & consider reasonable alternatives
 - e.g. If replacing pier compare to rehabilitating current pier
 - e.g. compare large transit project to smaller project serving denser areas
- Correctly identifying affected population is linked to baselines
 - Match impacts to corresponding population affected by it
 - Matching travel time savings to correct population group and correct time period
 - Reduced shipping costs from diversion (e.g. truck to rail) need to be linked to a realistic justification to baseline growth & forecast traffic
 - NOW LETS TALK RIDERSHIP





Ridership

- Most benefits depend on ridership (“user-ship”) estimates
- Provide forecast estimates
 - Basic underlying assumptions
 - Data sources
 - Methodology
- Provide forecasts for intermediate years
 - Not just single forecast year
- Assess reliability of forecasts
- Remember, if DOT Econ Team has issues with basis for ridership forecasts it will lower the project’s net benefit rating!





BCA vs. EIA

- Economic Impact Analysis (EIA) focuses on local benefits
 - Static analysis that ignores negative impact of transfer of activity from one location to another
 - Ignores costs to other localities
 - Includes transfer payments as “impacts”
- BCA focuses on national benefits (including local)
 - Dynamic analysis that nets out benefits & costs across areas
- DOT Econ team will not count transfers as benefits
 - Payrolls, tax revenues, real estate improvements, transit fares, etc.
 - Focusing your analysis on transfers will lower the project's net benefit rating!





Transparent & Reproducible Analysis

- BCA's must provide enough information so a reviewer can follow the logic & reproduce the results
 - Not doing so can lower the project's net benefit rating!
- Don't just provide a link to a spreadsheet or a large document
 - Provide a verbal description to walk reviewer through calculations
 - Provide Good Documentation
 - Cite outside data sources (page number, cell in spreadsheet, etc.)
- If a BCA uses a “pre-packaged” model, applicants must provide detailed explanations of model assumptions & inputs, as well annual benefit & cost streams by type



Long-Term Outcome	Types of Societal Benefits
Quality of Life	Land Use Changes that Reduce VMT Increased Accessibility Property Value Increases
Economic Competitiveness	Travel Time Savings Operating Cost Savings
Safety	Prevented Accidents (Property Damage), Injuries, and Fatalities
State of Good Repair	Deferral of Complete Replacement Maintenance & Repair Savings Reduced VMT from Not Closing Bridges.
Environmental Sustainability	Environmental Benefits from Reduced Emissions



+ Benefits – Quality of Life

- Quality of Life benefits are often associated with:
 - Accessibility
 - Improved access to jobs, amenities
 - Accessibility to wider range of transportation modes
 - Transit, bicycle lanes, walking
- Any mode shift from private vehicles to transit
 - Accurate ridership baseline & forecasts
 - Any travel time savings? Reduced emissions from private vehicles? Reduced number of accidents?
 - Must be trip wide reduction in travel time (e.g. a 30 second reduction in boarding won't likely affect a posted schedule)
- Land Value Impact & Bicycle/Pedestrian trails



+ Quality of Life (continued)

- Land Value Increases from Transit
 - Net out any increase from time savings or from a reduction in land values in nearby areas
 - Preferred method is conducting a project-specific hedonic study
 - If using benefit-transfer, applicant should meet criteria noted in OMB Circular A-4
 - Expect basis to be a peer-reviewed study and to have proposed project share similar characteristics with original study
 - e.g. transit type, number of stations and track miles, type of neighborhood, retail activity, per capita income, geographic region, city size, etc.
 - This is hard to do in practice – if you don't meet benefit transfer criteria the DOT reviewer won't include these benefits
 - If you can't meet criteria, limit BCA to a qualitative discussion of these benefits
 - DOT Reviewers will consider them in assigning a rating



+ Quality of Life (continued)

- Bicycle/Pedestrian trails
 - Science for estimating mobility benefits to existing users is not well developed or widely accepted
 - Applicants should limit themselves to a qualitative discussion of these and similar types of benefits
 - DOT Reviewers will consider them in assigning a rating
 - Focus on mode shift and any resulting time savings (both shifting from car and for remaining drivers), reduced operating costs, & emissions
- Non-Transportation benefits (e.g. improved water quality)
 - DOT Reviewers will not attempt to validate & reproduce
 - We will list the benefits in our write-up but the BCA Assessment will be one of the two Uncertain Ratings





Benefits–Economic Competitiveness

- Benefits in this category typically include:
 - Savings to passengers, carriers, and shippers
 - Lower operating costs
 - Travel time savings
 - Applicants must demonstrate how benefits are experienced by affected population
 - Don't double count operating cost savings (e.g. to shippers and then again to consumers)
 - If you are counting operating cost savings that include fuel costs (e.g. cost of driving per mile) don't include fuel costs separately
 - Not easily quantified benefits (↑ freight reliability & ↑ shipping time for freight) will be considered by DOT Reviewer in their rating





Benefits – Safety

- Safety benefits are typically associated with reducing fatalities, injuries, crash costs, and hazmat releases
- Benefits should be based on good crash data and valid analysis of cause (crash causation factors)
- When only a few cases are involved, applicant should provide a linkage to how the proposed project would have eliminated those cases
- Available crash data may need to be converted from KABCO to MAIS (see BCA Resource Guide)
- Recommended values for Value of Statistical Life (VSL), injuries, property damage are available in BCA Resource Guide
- If modal diversion the basis for safety benefits, applicant must provide a clear analysis on how the diversion will take place





Benefits – State of Good Repair

- State of Good Repair benefits can include:
 - Reducing long-term maintenance and repair costs (life-cycle costs)
 - Travel time savings (from preventing closures of facilities, lack of speed and weight restrictions)
 - Other user benefits from better pavement, improved safety
- Need to consider benefits and costs of alternatives
 - Replacement vs. rehabilitation
- Risk analysis



+ Benefits – Environmental Sustainability

- Environmental sustainability benefits are typically from reduced emissions
 - Greenhouse gases (e.g., CO₂)
 - SO_x
 - NO_x
 - Particulate matter (PM)
 - Volatile organic compounds (VOC)
- Recommended values are available in BCA Resource Guide





Costs

- Provide costs from all sources (local, State, other Federal grants, private)
- Direct capital costs: construction, design, land acquisition
- Beyond capital costs
 - O&M, rehabilitation, life-cycle costs
 - External costs: noise, congestion, pollutants
 - Cost to users during project construction: increased delay, vehicle operating costs
- Costs of whole project should be compared with benefits of whole project (no “leveraging”)
 - Can’t just compare TIGER costs to whole-project benefits
 - Can compare benefits and costs of just one phase if it has independent utility



+ Concluding Remarks

- We don't rank projects by B/C Ratio
- Always document and provide reliable sources for data and calculations
- Be realistic in assumptions and estimates
- Qualitative discussion of benefits helps supplement understanding for difficult-to-measure benefits
- Consider the viewpoint of objective reviewers
 - Are estimates plausible and reasonable?





BCA Resources

- TIGER Website: www.transportation.gov/tiger/
 - February 26, 2016 Federal Register NOFA
 - BCA Guidance & Resource Guide
 - BCA Examples
 - Tribal BCA Examples
 - Preparing a BCA for a Rural TIGER Grant Application (August 2011)
 - 2010 archived webcast for *Benefit-Cost Analysis for Transportation Infrastructure: A Practitioner's Workshop*
- The Value of Statistical Life (VSL) and Value of Time (VOT) guidance will be updated and posted on www.transportation.gov/tiger/ soon.
- USDOT offers technical assistance to help applicants through the TIGER process
- General inquiries to TIGERGrants@dot.gov about BCA before April 29, 2016





Must have submitted Applications on or before
April 29, 2016 by 8:00 p.m. EDT via
www.grants.gov.

Question and Answer Session

